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EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 10/27/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/075,602

Applicant(s)

HUNG ET AL.

Examiner

Lynette T. Umez-Eronini

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14, 18, 21 and 28-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14, 18, 21 and 28-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION***Specification***

1. The amendment filed July 30, 2003 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: The oxygen-free and SF₆-free gas formulation comprising CHF₃, Ar and (i) HCl or BCl₃ and (ii) Cl₂, "which consists essentially of CHF₃, Ar" and "which consists HCl or BCl₃ and CHF₃, Ar and Cl₂" respectively are not supported by the Specification. "A consisting essentially of" claim occupies a middle ground between closed claims that are written in a consisting of format and fully open claims that are drafted in a comprising format." PPG Industries v. Guardian Industries, 156 F.3d 1351, 1354, 48 USPQ2d 1351, 1353-54 (Fed. Cir. 1998). For search and examination purposes, absent a clear indication in the specification of what the basic and novel characteristics actually are, "consisting essentially of" will be construed as equivalent to "comprising." See, e.g., PPG, 156 F.3d at 1355, 48 USPQ at 1355 ("PPG could have defined the scope of the phrase consisting essentially of for purposes of its patent by making clear in its specification what it regarded as constituting a material change in the basic and novel characteristics of the invention"). When an applicant contends that additional steps or materials in the prior art are excluded by the recitation of "consisting essentially of," applicant has the burden of showing that the introduction of additional steps or components would materially change the characteristics of applicant's invention.

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Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 34 and 35 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 34, "The gas formulation of Claim 14, which consists essentially of CHF₃, Ar and HCl or BCl₃; and

In claim 35, "The gas formulation of Claim 18, which consists essentially of CHF₃, Ar" and Cl₂" introduce new matter which lacks support.

Claim Rejections – 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. Claims 14, 28, 29, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mak et al. (US 5,384,009).

As pertaining to claims 14, 28, 29, 34, and 35, Mak teaches "The process gas lacks oxygen and comprises: (i) a primary etchant selected from the group consisting of **chlorine**, fluorine, and bromine; (ii) a secondary etchant suitable for etching grain boundaries in the substrate; and (iii) xenon (same as inert carrier gas). A gas passivator such as N₂ (same as an inert carrier gas), HCl, CHF₃ (same as applicant's fluorine containing gas), CF₄ (same as applicant's fluorine containing gas), CH₄, or mixtures thereof, can be added to the process gas (column 2, lines 20-26). Maki further teaches, " . . . more preferably the secondary etchant is selected from the group consisting of BCl₃, . . . and mixtures thereof (column 2, lines 30-35). The aforementioned reads on,

An oxygen-free plasma etching gas formulation comprising CHF₃, and BCl₃, and the gas formulation being free of SF₆.

Mak differs in failing to teach an etching gas comprising argon, in claim 14.

It is well known in the art that noble gases include helium, argon or nitrogen, neon or xenon and are used as carrier and diluent gases.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to replace Mak's xenon with argon since both gases are seen as equivalent: they belong to same chemical family and possess the same chemical properties. Hence, substitution of one for the other would have been obvious for the purpose of providing an inert carrier gas.

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6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mak et al. (US '009) in view of Harshbarger et al. (US 4,208,241).

Mak teaches "The process gas lacks oxygen and comprises: (i) a primary etchant selected from the group consisting of chlorine, fluorine, and bromine; (ii) a secondary etchant suitable for etching grain boundaries in the substrate; and (iii) xenon (same as inert carrier gas). A gas passivator such as N₂ (same as an inert carrier gas), HCl, CHF₃ (same as applicant's fluorine containing gas), CF₄ (same as applicant's fluorine containing gas), CH₄, or mixtures thereof, can be added to the process gas (column 2, lines 20-26). Mak further teaches, " . . . more preferably the secondary etchant is selected from the group consisting of BCl₃, . . . and mixtures thereof (column 2, lines 30-35). The aforementioned reads on,

An oxygen-free plasma etching gas formulation comprising CHF₃ and chlorine, in the gas formulation being free of SF₆.

Mak differs in failing to teach an etching gas comprising argon.

It is the examiner's position that it is well known in the art that noble gases include helium, argon or nitrogen, neon or xenon and are used as carrier and diluent gases.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to replace Mak's xenon with argon since both gases are seen as equivalent: they belong to same chemical family and possess the same chemical properties. Hence, substitution of one for the other would have been obvious for the purpose of providing an inert carrier gas.

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Mak differs in failing to specify the ratio of the sccm flow rates of CHF₃:argon:chlorine is 5 to 80: 5 to 80: 5 to 60.

Harshbarger teaches etch gas composition and inlet flow rate that typically ranges for flow rate is 10-500 sccm are parameters that are subject to control in (plasma) reactors (column 8, lines 17-21). Harshbarger's flow rate which ranges from 10-500 sccm shows that the flow rate of an etch gas composition encompasses the flow rate ratio of the etch gas composition as claimed in the present invention and provide evidence that the flow rate is a so-called "result effective variable."

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Mak by using Harshbarger's method of varying the flow rate of an etchant gas, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

7. Claims 21 and 30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mak et al. (US '009).

Maki teaches "The process gas lacks oxygen and comprises: (i) a primary etchant selected from the group consisting of **chlorine**, fluorine, and bromine; (ii) a secondary etchant suitable for etching grain boundaries in the substrate; and (iii) xenon (same as inert carrier gas). A gas passivator such as N₂ (same as an inert carrier gas), HCl, CHF₃ (same as applicant's fluorine containing gas), CF₄ (same as applicant's fluorine containing gas), CH₄, or mixtures thereof, can be added to the process gas

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(column 2, lines 20-26). Maki further teaches, " . . . more preferably the secondary etchant is selected from the group consisting of BCl_3 , . . . and mixtures thereof (column 2, lines 30-35). The aforementioned reads on,

An oxygen-free plasma etching gas formulation comprising (i) more than one fluorine-containing compound and (iii) chlorine, the formulation being free of SF_6 .

Mak differs in failing to teach the inert gas is selected from the group consisting of krypton, argon, neon, helium, and mixtures thereof, **in claim 21**; krypton, argon, neon and helium, respectively **in claims 30, 31, 32, and 33**.

It is the examiner's position that it is well known in the art that noble gases include helium, argon or nitrogen, neon or xenon and are used as carrier and diluent gases.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to replace Mak's xenon with argon since both gases are seen as equivalent: they belong to same chemical family and possess the same chemical properties. Hence, substitution of one for the other would have been obvious for the purpose of providing an inert carrier gas.

Response to Arguments

8. Applicant's arguments with respect to claims 14, 18, 21, and 28-35 have been considered but are moot in view of the new ground(s) of rejection.

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Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703-305-2667. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and for After Final communications.

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KIN-CHAN CHEN
PRIMARY EXAMINER

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October 13, 2003